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ABSTRACT

This research study used Vygotsky's (1978) "zone of proximal development" and Wertsch's (1979) "levels of social interaction" as an alternative to Markham's method for describing a child's awareness of implicit inconsistencies in an essay. Two different essays with implicit inconsistencies were read to 30 third-grade and 30 sixth-grade students in a New Jersey elementary school, who were randomly selected from children falling within one of three reading achievement levels. Results supported the hypothesis that the student's level of social interaction varied with the grade level. Sixth graders tended to function independently, while third graders needed adult directives to complete the task. An analysis of the sequence of essay presentation indicated that the student's level of social interaction on the second essay was dependent upon the student's level on the first essay, regardless of essay content. Reading achievement level was not associated with the level of social interaction. Results are discussed in relation to two of Vygotsky's themes: inter- and intra-psychological functioning and zone of proximal development. A two-page list of references and tables of statistical data are appended. (Author/RH)

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An Application of Vygotsky's Theory to Children's Awareness of Inconsistencies

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Abstract

This research study used Vygotsky's (1978) "zone of proximal development" and Wertsch's (1979) "levels of social interaction" as an alternative method for describing a child's awareness of implicit inconsistencies in an essay. Employing Wertsch's four levels of social interaction as a measure of the child's ability to detect implicit inconsistencies rather than the "either/or" categorization used in previous studies (Markman, 1977, 1979), two different essays with implicit inconsistencies were read to 30 third and 30 sixth grade students, randomly selected from those children falling within one of three reading achievement levels. The results supported the hypothesis that the student's level of social interaction varied with the grade level, sixth graders tended to function independently (self-regulation), while third graders needed adult directives to complete the task (other-regulation). In addition, an analysis of the sequence of essay presentation indicated that the student's level of social interaction on the second essay was dependent upon the student's level on the first essay, regardless of essay content. Reading achievement level was not associated with the level of social interaction. Results are discussed in relation to two of Vygotsky's themes - inter- and intra-psychological functioning and zone of proximal development.

An Application of Vygotsky's Theory to Children's Awareness of Inconsistencies

Metacognition and cognitive monitoring have recently been the focus of intensive investigation. Such studies have shown that older children are better at monitoring their ability to recall than younger children (Flavell, Friedricks, & Hoyt, 1970). Markman (1977) showed that younger elementary children were poorer at detecting omissions and obscurities in verbal instructions than older children. Results like these and other studies tend to indicate that young children are limited in their metacognition and cognitive monitoring; thus leading some researchers to develop models about these processes (Flavell, 1979).

To date these studies have focused upon such topics as attention, memory, language acquisition, and comprehension. Those studies concerned with comprehension have indicated that the use of consistency as a standard in monitoring comprehension may be difficult for elementary school children. A study by Brown and Smiley (1977) has shown that young children are not always aware of the organization and the structure of prose comprehension. Another study by Markman (1978) has produced evidence that children are more empirically oriented rather than concerned with the logical structure of prose. These two lines of reasoning have lead to the conclusion by Markman (1979) that "children may have difficulty using consistency as a standard for evaluating their own comprehension, especially when

inferential processing is required to detect inconsistency" (p. 645).

From that conclusion Markman has published a paper with three studies (1979) examining elementary school "childrens' use of a consistency standard as the processing demands required to uncover the inconsistency vary" (p. 645). The first study examined how well children detected explicit versus implicit inconsistencies. Twenty children from each of grades three, five and six were randomly assigned to one of the two conditions which differed as to whether the inconsistency was explicitly or implicitly stated within a paragraph. Depending on the condition, three essays were read twice to each child. After the second reading a series of twelve probes were initiated. These probes were discontinued when a child revealed that the problem was detected in the essay. The more probes used, the lower the child's performance. A discussion about Markman's scoring procedures is considered necessary here.

Markman developed a measure of the child's ability to detect an inconsistency in the paragraphs. Initially, the author determined the child's score as the probe number at which the probing was discontinued. Therefore, the scores ranged from 1 (an immediate detection of the inconsistency) to 13 (an inability to detect the inconsistency after probing) for each essay. Then, the author divided the scores into two distinct categories: 1-7 and 8-13. Ignoring the ordinal quality of the scores, the author considered only those children who detected the inconsistency before probe eight on two or

more essays as having the ability to detect inconsistencies. Children who detected the inconsistency after probe seven were not considered competent in this ability.

Markman summarized the findings of the first study by indicating that, when inferences were required in detecting inconsistencies, elementary school children were unaware of the problems. The children were better at noticing explicit rather than implicit inconsistencies. Even the sixth graders were as poor as the third graders in detecting the implicit inconsistencies. These childrens' performances were poor even though they had the logical abilities to draw required inferences, had excellent recall of material, or were not embarrassed to ask questions.

In that first study, even the twelve year old students weren't always aware of the obvious contradictions in the explicit essays. But Markman's third study contained an interesting variation in the procedures in order "to better define the limits of the children's spontaneous ability" (1979, p. 651). In one condition (standard), the standard consultant instructions were the same as in the first study. In the second condition (set), the children were warned with an additional set of instructions that there was a problem with each of the essays. Using the same explicit and implicit essays, these two instructional conditions created four experimental conditions: **standard-explicit**, **standard-implicit**, **set-explicit**, and **set-implicit**. The scoring procedures for the third study were the same as that used

in the first study.

According to Markman's interpretation, the overall "performance of the children in the standard condition was comparable to the performance of children in the first study" (p. 652). But, the results of the set condition were strikingly different. These children were able to detect the problem significantly better than the children in the standard consultant condition. A second interesting finding was that the sixth graders performed equally as well with implicit material as with explicit material. Markman summarized the third study by indicating that the nature of the standard one chooses to monitor one's comprehension is an important factor in cognitive monitoring.

Subsequently, Markman (1979) gave the following overall conclusion for the three studies:

> Taken together, the results suggest that to notice inconsistencies children have to encode and store the information, draw the relevant inferences, retrieve and maintain the (inferred) propositions in working memory, and compare them. Third through sixth graders do not spontaneously carry out those processes that they are capable of carrying out. (p. 643)

In that quoted statement, Markman, first, has attributed a level of competence for detecting inconsistencies to these children by defining those processes that are needed to notice these

inconsistencies. Then, Markman has attempted in her studies to explain why these children are incapable of carrying out those processes. Flavell and Wohlwill (1969) examined such a research strategy and argued that intertask consistency could be explained by considering performance and competence separately. Therefore, in Markman's study, the inconsistencies of elementary school childrens' awareness of their own comprehension failure may have been related to some "performance factor" hindering the occurrence of the presumed "competence." Markman's study suggested that two factors, "inferential processing requirements and the nature of the standard" (1979, p. 643), affect the childrens' awareness of a problem.

This general line of reasoning for the assessment of cognitive development, first espoused by Flavell and Wohlwill (1969), was described by Stone and Day (1980) as "negative rationalism," a term borrowed from Rommetveit (1977). Negative rationalism describes the general strategy for studying cognitive development in which the child's thought is explained by the differences in the child's actual performance as opposed to what should have happened according to some formalized logical theory or model. In research this leads to what Larsen (1977) calls "simplification strategy." The practice of simplification strategy dictates that, since many factors affect the performance on any one task, all relevant factors must be measured and controlled before drawing any conclusion about one aspect of the child's ability from the child's performance on a task. Therefore,

research adopting this simplification strategy tended to identify separate performance factors that were theorized to be blocking the demonstration of a competence. Larsen (1977) further claimed that researchers, who used this simplification theory, could not assume the child possesses a particular cognitive operation, since any additional performance factor can be identified as blocking the demonstration of that cognitive operation.

Stone and Day (1980) summarized the problem in the field of developmental psychology, as well as in psycholinguistics, as caused by this false understanding of a relationship between performance and competence. The authors then distinguish between the two models:

> Competence models are an abstract characterization of the potentialities of the behavior that is of interest to us. A competence model does not specify the actual psychological processes that generate the behavior. Thus, criteria like parsimony, internal coherence, aesthetics, and scope, but not of isomorphism to process, are used for evaluating the models. Performance models, in contrast, are intended to specify the actual psychological processes involved in a cognitive activity, and thus isomorphism to psychological events is primary criterion for their adequacy. (p. 337)

The research studies in the area of metacognition and cognitive monitoring have adopted the identic rationale of negative rationalism

and technique of simplification strategy (e.g., Brown & Smiley, 1977; Markman, 1977, 1979; Markman & Gorin, 1981). Even in the study of these cognitive activities of children, the two models of competence and performance must be kept distinct. Stone and Day (1980) provided an alternative approach to the use of a performance model strategy that does not treat the abstractness of competence models as substantial and concrete. This approach applied the concepts from the work of the Soviet psychologist Lev Semenovich Vygotsky (e.g., Vygotsky, 1962). Comparing the Rationalist tradition in the Western philosophy to the influence of dialectic materialism on Soviet philosophy, the authors indicated that the "Soviet psychologists and psycholinguists have shunned discussions of abstract structure and have instead focused on the activity of the individual in his social and historical context" (Stone & Day, 1980, p. 337). Therefore, Soviet models of cognitive activities were generated without any concept of "competence."

The work of Vygotsky (1978), as clarified by Wertsch (1979), examined the process of how individuals acquire control over their own behavior. One of Vygotsky's most interesting concepts is his zone of proximal development, defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 85). Vygotsky argued that what children

can do with guidance from an adult or a more capable peer is more indicative of their mental development than what they can do alone. This reflects Vygotsky's view of the role of social interaction plays in the development of higher mental functioning. Vygotsky believed that higher mental functioning appears first on an inter-psychological (social) plane, and then later on an intra-psychological (individual) plane.

In this paper, I designed a research study that shows how social interaction at the levels of interpsychological functioning and independent problem solving at the intrapsychological level would be an alternative method of describing the events in Markman's conclusion; that is, why "third through sixth graders do not spontaneously carry out those processes that they are capable of carrying out" (Markman, 1979, p. 643). This research study replicated the first of Markman's three studies (1979), using only the implicit essays and equating all groups for grade, sex, and reading ability. This proposed approach as suggested by the Soviet themes could clarify an understanding of the actual processes underlying the child's thought by examining the child's level of social interaction.

Wertsch (1979) has delineated four levels in the transition from other-regulation (i.e., a communicative situation in which the adult utterances are used to regulate the child's performance in a task) to self-regulation (i.e., a child can complete the task independently). It should be pointed out that in an individual child these levels are

not to be taken as characterizing the overall status of cognitive capacities, but rather the capacity with respect to a particular task or activity.

These levels are summarized as follows:

Level I: The child fails to interpret the adult directives as being related to the task situation and is therefore unable to perform the task as the adult perceives it.

Level II: The child's understanding, although far from complete agreement with adults, allows the child to be aware that the adult directives are concerned with the task. The child responds to specific directives and commands of the adult in connection with the specific task.

Level III: The child's understanding of the definition of task situation coincides with the adult. Although other-regulation is present, the child has taken on a significant share of the strategic responsibility for the task. The child responds to implicit directives, making all the inferences necessary to interpret an adult.

Level IV: The problem-solving activity changes from the interpsychological to the intrapsychological plane. The child carries out the task without any strategic assistance from an adult.

A comprehensive summary on the levels of interaction in transition from other-regulation to self-regulation can be found in Table 1.

Insert Table 1 about here

Using the four levels as delineated by Wertsch (1979) and the classification of directives by Ervin-Tripp (1976), I modified the original probes used by Markman (1979) in order to develop a set of questioning probes that distinquish the four levels of transition from other-regulation to self-regulation. These questioning probes are explained and presented in the "Procedures" section of this study. The rationale behind this different set of experimental protocols was initially suggested by Stone and Day (1980). They suggested that further experimental study could investigate how the deployment of the control-of-variables strategy is assisted by the experimental prompts used in their study. The authors proposed that variations in experimental protocol could clarify which types of questions asked between task presentations could serve to structure the responses of the pre-adolescents. In this research study, the questions were modified and ordered to structure the responses of the children by increasing adult assistance. These questions therefore identified the level of the child-adult and child-task interactions.

The primary aim of this research study is to use Vygotsky's concepts and Wertsch's levels of social interaction as an alternative method for describing a child's awareness of inconsistencies in a passage. This research approach proposes four distinct levels of the

child's awareness of inconsistencies in a passage rather than the "either/or" categorization utilized by Markman's scoring system. This research study will assess the child's level of social interaction with respect to this specific task through the questioning probes.

It was hypothesized that childrens' levels of social interaction in the ability to consistently detect logical inconsistencies implicitly stated in essays will vary with the grade level of the children. Such a hypothesis suggests an alternative method for describing the findings of Markman, which is, "third through sixth graders do not spontaneously carry out those processes that they are capable of carrying out" (1979, p. 643).

It is further hypothesized that these levels of social interaction will vary with the children's reading ability. Stone and Day (1978) introduced this variable, using only those children who scored between the fiftieth and the eighty-fifth percentile on a reading comprehension test, as a controlling factor to insure that the children were able to handle the verbal justifications needed in the protocols. This study investigated the effects of three reading levels (Above, Average and Below) on the children's levels of social interaction with the questioning probes. A recent study by Wixson (1983) indicated that the children's learning from a text varied as a function of the interaction among reader, text, and question; particularly, the questions given by the teacher.

From the first hypothesis, it is predicted that the frequency

distribution of these four levels of social interaction for the sixth graders will be skewed significantly toward the levels of self-regulation (Levels III and IV). The frequency distribution for the third graders will be skewed significantly toward the levels of other-regulation (Levels I and II). It is further predicted that these frequency distributions will be significantly different from each other.

From the second hypothesis, it is predicted that the frequency distribution of these four levels of social interaction for the Above average readers will be skewed significantly toward the levels of self-regulation (Levels III and IV). The frequency distribution for the Below average readers will be skewed significantly toward the levels of other-regulation (Levels I and II). It is further predicted that these frequency distributions will be significantly different from each other.

Method

Subjects

Thirty children from each of grades three and six of the Hopatcong Borough School system located in northwest New Jersey participated in this research study. The mean ages of the children were 9-3 and 12-4 for the two grades, respectively. Thirteen of the third graders and seventeen of the sixth graders were female. At each grade level, these children were randomly selected from those children falling within one of three reading levels. The students' reading

levels were determined by their national percentile (%ile) rank on a standardized achievement test. The percentile ranks indicate the relative standing of a pupil in comparison to other pupils in a particular norm group. The students' reading levels were divided into three categories: Below grade level [below the 35%ile]; Average grade level [35%ile - 65%ile]; and Above grade level [above the 65%ile]. These reading percentile levels (national norms) were based upon the reading subtest results on the spring administration of the Iowa Tests of Basic Skills.

Procedure

Before the study began, I introduced myself to the children, indicating that I was publishing a book of essays by children. I asked the children to serve as consultants, emphasizing that I needed their advice in determining the comprehensibility of the essays. They were encouraged to suggest any changes that they thought would make the essays easier to understand.

The children were administered two of the three different essays with implicit inconsistencies in a random assigned order. The children were told this: "Now I am going to read to you an essay written by another child. This child is about the same age as you. If at any point you are confused, please tell me. I need to know if this essay is perfectly clear and easy to understand." This essay was read twice, with a pause between the first and the second reading before any questioning probes were given (described below). The

child's comments were recorded verbatim for further scoring by an independent judge. Once the child clearly indicated the inconsistency in the essay, probing was discontinued and the second essay was introduced. The number of that questioning probe, at which the child indicated the inconsistency, determined the category of the level of social interaction. I then pretended to write down the clarification. If the child could not indicate any confusion with the essay by the thirteenth probe, I thanked the child for the assistance.

The same procedures for the first essay were followed for the second. Once the procedures for the second essay were finished, the probing ended and the child was thanked for the assistance.

Implicit essays. The implicit essays are described below. These essays were taken from the Markman study (1979) with minor modifications, needed to clarify sentence style.

ANTS

This is an essay about ants-

There are some things that almost all ants have in common. For example, they are all amazingly strong and can carry objects many times their own weight. Sometimes they go very, very far from their nest to find food. They go so far away that they cannot remember how to go home. So, to help them find their way home, ants have a special way of leaving an invisible trail. Everywhere they go they put out an invisible chemical from their bodies. This chemical has a special odor. Another thing about ants is they do not have a nose. But ants always find their way home by following this invisible trail.

FISH

This is an essay about fish in the ocean-

Many different kinds of fish live in the ocean. Some fish have heads that make them look like alligators, and some fish have heads that make them look like cats. Fish live in

different parts of the ocean. Some fish live near the surface of the water, but some fish live way down at the bottom of the ocean. Fish must have light in order to see. There is absolutely no light at the bottom of the ocean. Some fish that live at the bottom of the ocean find their food by its color. They will only eat red fungus.

SNAKES

This is an essay about snakes-

There are many different kinds of snakes. Some snakes are eight feet long and very fat. Some snakes are only six inches long and very skinny. Some snakes have a poisonous bite, but some snakes are harmless and even help us. The garden snake, for example, helps us by keeping bad insects away from our gardens. Garden snakes eat these insects. They find the insects by listening for them. The insects make a special noise. Garden snakes do not have ears. But they can always catch plenty of insects. That is how they are able to help to keep our garden free of insects.

Questioning probes. The probes for each of the essays are listed below. The probes were read in order to the student until a question or a comment clearly indicated that the student noticed the problem in the essay. The parentheses contain the specific references respectively for those essays described above. The probes are:

1. Read essay. (Pause)
2. Reread essay.
3. "That's it. That's the information about ... (...ants." ...fish." ...snakes.")
4. "What do you think?"
5. "Do you have any questions about this essay?"
6. "Does this essay make sense to you?"
7. "Did this essay leave anything out?"
8. "Do you understand how ... (...ants find their way back to

their nests?" ...fish find their food?" ...snakes find insects to eat?")

9. "Can you tell me everything you learned about ... (...ants? ...fish? ...snakes?) Tell me what the essay was about."

At this point the student's spontaneous recall was recorded verbatim. If major portions of the essay were omitted, general questions about these omitted areas were asked. The next four questions specifically requested information from the child about the illogical condition within the essay.

The ant essay:

10. "How do ants find their way back to their nest?"
11. "What kind of trails do ants leave?"
12. "Do ants have noses?"
13. "How do ants smell the odor if they don't have noses?"

The fish essay:

10. "How do some fish find their food at the bottom of the ocean?"
11. "Is there any light at the bottom of the ocean?"
12. "Can fish see if there is no light?"
13. "How can fish see the color of the food in the dark?"

The snake essay:

10. "How do garden snakes find their food in the garden?"
11. "What do insects do?"
12. "Do snakes have ears?"

13. "How can snakes hear the special noise if they don't have ears?"

The first four probes (probes 1-4) provided no assistance for the student to notice the problem in the essay. The third and fourth probe were asked in order to provide an opening for the student to begin comments about the defined task situation (i.e.: to indicate if the essay was either perfectly clear and easy to understand or not). The next four probes (probes 5-8) provided indirect assistance for the student by making requests which implicitly directed the student to the task situation. These four probes required inferences on the part of the student in order for the questions to be interpreted as directions, since these four questions were ambiguous as to their function. The ninth probe was used to see if the student could spontaneously recall the essay. After the ninth probe, the remaining four probes (probes 10-13) provided direct assistance for the student by making explicit requests which directed the student to the task situation.

Scoring Procedure

The levels of social interaction were divided into four distinct categories (Wertsch, 1979). The individual student's performance on the presented task (the implicit essay) determined either the social context in which the child interacted with adults (Levels I - III, encompassing the "zone of proximal development") or the child's individual control over the activity. The student's zone of proximal

development level or self-regulation was determined by the category level of the questioning probes at which the student clearly indicated that the inconsistency was found in the essay. Markman (1979) found that the children's comments were classified into four categories: clearly adequate, possible awareness, assumptions, and knowledge. As in Markman's study, those comments that made a "clearly adequate" statement or question discontinued the questioning probes, assigning that probe number to the child.

Determining the level of social interaction, as compared to the method used by Markman (see Results and Discussion in Markman, 1979, pp. 646-647), assigned the child to a "process" level of social interaction rather than a "categorical" level of competence (i.e., either the student found the inconsistency or didn't find it).

The categorization of the four levels (refer to Table 1) is explained below in reference to the questioning probes:

Level IV: When the student clearly indicated the problem in the essay at any point during the questioning probes 1-4, it was obvious that the child has taken complete responsibility for the solving of the problem. The problem-solving process for this child has moved from the interpsychological to the intrapsychological plane. The transition from other-regulation to self-regulation was complete. The child was obviously in full control of the activity, able to define the task situation with ease. The first four questioning probes lent no assistance to the task, but provided an opening for the

child to comment.

Level III: If the child hasn't responded by the fourth probe, the next four questioning probes (nos. 5-8) were presented to the child. If at any point during these four probes the child indicated the problem, that child was said to be in the third level of the zone of proximal development. These four questioning probes were based upon Ervin-Tripp's (1976) classification of directives. These questions required inferences on the part of the child in order to understand the directive to the task situation. At this level, the child has an understanding of the task definition that coincides with that of the adult. Even though the social context requires other-regulation, the child could make all inferences necessary to interpret the adult's implicit directive. At this third level the child was functioning at the interpsychological plane.

Level II: If the child hasn't found the problem by the eighth probe, a ninth probe required the child to spontaneously recall the essay. After that recall, the questioning probes 10-13 were presented sequentially. If at any point during these questioning probes the child indicated the problem, that child was in the second level of the zone of proximal development. These questioning probes were specific and directed the attention of the child to the problem area. The child's understanding of the task situation was still far from a complete agreement with the adult. Even though the social context required other-regulation, the child was only aware that the

adult questions and directives were concerned with the task situation. Therefore this child will make the necessary inferences to participate fully. The child was still functioning in the interpsychological plane.

Level I: If the child has not responded by the thirteenth question, the child was unable to solve the problem. Even with other-regulation, the child was said to be unable to interpret the adult's strategic assistance. At this level, the child's understanding of the task situation was very limited. Therefore, the mis-match of the definitions of the task situation was so great, that both the child and the adult each had a different "language game."

Scoring Reliability. An independent judge, provided with a description of the questioning probes and the categorization of the levels of social interaction, scored all protocols. The judge agreed on 96.7% of the categorizations of the levels of social interaction as to the child clearly indicating a confusion with the presented essay.

Results

Sex, Essay Content, and Order of Presentation

Preliminary analyses of sex were conducted. Table 2 presents the number of boys and girls at each of the four levels of social interaction on the presentation of the first essay and the second essay. Chi-squares computed at the presentation of the first essay, χ^2 (3, N = 60) = 1.85, $p < .60$, and at the presentation of the second essay, χ^2 (3, N = 60) = 5.14, $p < .16$, indicated no significant

associations.

Insert Table 2 about here

Analyses on the content of the essays were conducted. Table 3 presents the number of students at their levels of social interaction according to the essay content on the first and the second presentation. Chi-squares computed for each essay on the first presentation, χ^2 (6, $\underline{N}$ = 60) = 5.50, $\underline{p}$ < .48, and on the second presentation of each essay, χ^2 (6, $\underline{N}$ = 60) = 4.90, $\underline{p}$ < .56, indicated no significant associations.

Insert Table 3 about here

Table 4 presents the students' levels of social interaction for each grade level on the first and the second presentation of an implicit essay. An analyses on the order of essay presentation (the first essay as opposed to the second) was conducted, using the paired-sample sign test. The number of increases in the levels of social interaction on the second presentation from the first was significant, z ($\underline{N}$ = 25) = 5.00, $\underline{p}$ < .01. It should be noted that, with the second presentation of an implicit essay, the student's level of social interaction either remained the same level or moved up the levels to other-regulation or self-regulation. In no instance did a student's

level drop to a lower level of other-regulation.

As shown by the totals in Table 3, the frequency distribution of students being unable to interpret the strategic assistance (Level I) to taking complete responsibility for the solving the problem (Level IV) shifted from the first presentation (29, 7, 5, 19) to the second presentation (15, 7, 3, 35).

Insert Table 4 about here

The variables of sex and essay content were eliminated from subsequent analyses. Further analyses on the main hypotheses will take into account the order of essay presentation.

Grade Level and Levels of Social Interaction

First presentation. Table 5 depicts the number of students according to the two grade levels with respect to their levels of social interaction on the presentation of the first and the second essay. On the first presentation of the essay, the grade level of the student was significantly associated with the levels of social interaction in the ability to detect logical inconsistencies implicitly stated in essays, χ^2 (3, N = 60) = 22.94, $p < .01$ (refer to upper portion of Table 5). A mean squared contingency coefficient, computed to measure the strength of this association, indicated that 38% of the variance is accounted for by this relationship. These results substantiate the initial hypothesis. As predicted in the

first hypothesis, the frequency distribution of the third graders were significantly skewed toward the levels of other-regulation (Levels I and II), χ^2 (3, $\underline{N}$ = 30) = 17.06, $\underline{p} < .01$. Although predicted in the first hypothesis, the frequency distribution of the sixth graders were not significantly skewed toward the levels of self-regulation (Levels III and IV), χ^2 (3, $\underline{N}$ = 30) = 6.78, $\underline{p} < .08$. These two distributions are shown in the upper portion of Table 5.

Insert Table 5 about here

Second presentation. As depicted in the lower half of Table 5, the grade level of the students was significantly associated with the levels of social interaction in the ability to consistently detect logical inconsistencies implicitly stated in essays, χ^2 (3, $\underline{N}$ = 60) = 11.85, $\underline{p} < .01$. The strength of this association indicated that 20% of the variance is accounted for by this relationship. The frequency distribution of the third graders were not significantly skewed toward the levels of other-regulation, χ^2 (3, $\underline{N}$ = 30) = 5.38, $\underline{p} < .15$; whereas, the frequency distribution of the sixth graders were significantly skewed toward the levels of the self-regulation, χ^2 (3, $\underline{N}$ = 30) = 18.73, $\underline{p} < .01$.

Insert Table 6 about here

Reading Level and Levels of Social Interaction

Contrary to the second hypothesis, the student's reading levels (Above, Average, and Below) were not significantly associated with the levels of social interaction, for either the first presentation, χ^2 (6, N = 60) = 5.13, p < ..53, or the second, χ^2 (6, N = 60) = 3.77, p < .72, as depicted in Table 6. The results of the predictions from the second hypothesis varied with the sequence of the presentation. The frequency distribution of the above average readers was not significantly skewed toward the levels of self-regulation (Level III and IV) for the first presentation, χ^2 (3, N = 20) = 3.28, p < .35; but was significantly skewed for the second presentation, χ^2 (3, N = 20) = 10.833, p < .05. The opposite pattern was noted for the below average readers. The frequency distribution of the below average readers was significantly skewed toward the levels of other-regulation (Level I and II) for the first presentation, χ^2 (3, N = 20) = 9.26, p < .05; but was not significantly skewed for the second presentation, χ^2 (3, N = 20) = 5.65, p < .13. The frequency distributions for the Above Average and Below Average reading levels were not significantly different from each other in either the first or the second presentation, χ^2 (3, N = 40) = 3.80, p < .29 and χ^2 (3, N = 40) = 3.00, p < .40, respectively.

Discussion

As originally hypothesized, the children's levels of social interaction in the ability to detect logical inconsistencies

implicitly stated in essays varied with the grade level. This occurred not only on the presentation of the first essay, but also on the presentation of the second essay. The interactions of the sixth graders tended toward the levels of self-regulation, whereas those of the third graders tended toward the levels of other-regulation. These results contradicted those in Markman's first of three studies (1979), which indicated that sixth graders were as poor as third graders in detecting implicit inconsistencies.

Although these results opposed those of Markman's, the primary aim was to use Vygotsky's work and Wertsch's "levels of social interaction" as an alternative method for describing a child's awareness of inconsistencies in an implicit essay. Before discussing this alternative method, two of Vygotsky's themes shall be explained.

Vygotsky's Themes

Inter- and intra-psychological planes. The first theme depicts higher mental functioning as appearing first on an "inter-psychological" (social) plane, and later on an "intra-psychological" (individual) plane. Vygotsky assumed that higher mental functioning has social origins. The adult-child interaction is central to this theme. With this interaction the child is able to understand the task situation, to interpret the adult's strategic assistance, and to respond to specific and then to implicit directives (See Table 1). Gradually, as a result of repeated interactions, the transition of the adult's control (other-regulation) shifts to that of the child's

(self-regulation) (Wertsch, 1979).

This concept of a transfer of control from other-regulation to self-regulation is useful for developing an alternative method in this research study. This concept places the emphasis on behavior in its situational context, locating the control of that behavior in the individual rather than in the task or stimuli. In this study, the sequence of the questioning probes paralleled Wertsch's levels of social interaction, giving the child, first, the opportunity to demonstrate self-regulation (Level IV), and then, if needed, the assistance of other-regulation to complete the task situation.

Zone of proximal development. The second theme, closely associated with the first, opposes the traditional methods of assessing capabilities. Vygotsky (1978) argued that an assessment of an individual's developmental status involved not only what an individual could do independently (self-regulation), but also what could be done with the help of others (other-regulation). Vygotsky called this difference between these two assessments as the "zone of proximal development", measuring the extent to which the individual could expand the intra-psychological control by social interaction. No underlying competence is presumed, thus opposing a traditional Western interpretation of a performance deficit. This concept does not consider that an individual "has" a particular behavior, but rather, that an individual can be "assisted" to learn this particular behavior. Therefore, this more positive view emphasizes how the

individual learns a specific task, rather than proposing a competence and testing if the individual has it or not.

Using these two themes of the inter- and intra-psychological planes and the zone of proximal development, the next section shall discuss an alternative interpretation to children's awareness of inconsistencies in implicit essays.

Alternative Interpretation of Children's Awareness

Shift from other-regulation to self-regulation. The significantly different frequency distributions for both grade levels at the first and then the second presentation of the essays illustrate exactly that skewness one would expect to see in the zone of proximal development. With increasing age (represented by grade levels), it was progressively easier for the child to acquire control at the intra-psychological (self-regulation) level. Proportionately, the percentage of sixth graders (71%) significantly acquired control more than the percentage of third graders (56%), $z = 5.81$, $p < .01$ (refer to shift in Table 4).

The differential results of the predictions at each grade level for each essay presentation also illustrate the zone of proximal development and the transition of other-regulation to self-regulation. The frequency distribution of the third graders were significantly skewed toward the levels of other-regulation (Levels I and II) on the first presentation of the essay, but not on the second presentation of the essay. On the first presentation of the essay, twenty-two third

graders (73%) were at the first level of social interaction. These third graders were limited in their understanding of the task situation and were unable to interpret the strategic questioning probes. Whereas, by the second presentation, only twelve third graders (40%) were at this first level of social interaction. This shift toward self-regulation can be seen in Table 4.

The reverse trend was seen for the sixth graders. The frequency distribution of the sixth graders was not significantly skewed toward the levels of self-regulation (Levels III and IV) on the first presentation of the essay, but was on the second presentation of the essay. Again, with the presentation of the second essay, a shift toward self-regulation was seen (See Table 4).

On the outset, such a shift in results for both grade levels might not seem too significant. But Table 4 indicates that in no situation did any of the students shift in the other direction; that is, toward Level I. All students either remained at their level of social interaction, or shifted in the direction of the levels of self-regulation. Such results strongly suggest that the sequence of the essay presentation was not independent of each other. The results of the second presentation depended upon that of the first presentation.

Scoring procedures. To explain her results, Markman developed a scoring method that measured the child's ability to detect the inconsistency in the paragraphs. Her scoring method and that used in this research study are somewhat analogous. The questioning probes

for both studies were alike, in that the questions proceeded from obscure statements to more specific questions directed at the task situation. The child's score was that probe number at which the probing was discontinued. But after these facts, the similarity ends. Markman determined that the scores fell into two distinct categories: probes 1-7 and probes 8-13. Ignoring the ordinal quality of the scores, the author considered only those children who detected the inconsistency by probe seven on two or more essays as having the ability to detect inconsistencies. Children who detected the inconsistency after probe seven were not considered competent in this ability.

The scoring method used in this study divided the questioning probes into three groups that would indicate whether the child was at the level of self-regulation or in the area of other-regulation. If the child could not find the inconsistency by probe 13, the mismatch of the task definition was so great, that both the child and the adult had a different language game (Level I). Therefore, since the child was unable to interpret the adult's strategic assistance, the child was unable to perform the task as the adult perceived it.

In comparing the two scoring methods, it is obvious that Markman assumed a level of competence in these children and explained the results from the negative rationalist perspective (Rommetveit, 1977). Since the sixth graders' actual performance was opposed to what should have happened according to some formalized competence model, Markman

delineated possible explanations for the children's poor performance -- in terms of memory failure, limited logical capacity, assumptions, and demand characteristics (1979, pp. 647-648). The method used in this research study doesn't assume that the children have the ability to detect logical inconsistencies; but rather, attempts to find the pattern and discover how the children are assisted in discovering these inconsistencies.

Markman's scoring method assumed the independence of each presentation of the essays, counting only the number of detections and not the sequence. The scoring procedure in this study examined the sequence of the children's levels (as discussed in the previous section). The results of the sequence strongly suggest that the questioning probes were successful in providing strategic assistance to the child in transition from other-regulation to self-regulation. This technique of questioning probes could be used in future studies to examine the transition from other-regulation to self-regulation in different situational contexts.

One obvious problem with this research study was the need to employ more varied and robust statistical measures with the data. Presently the data was qualified, using only non-parametric statistical tests. If future studies could quantify the data, more robust and appropriate statistical manipulations could evaluate the substantive questions.

Reading ability and levels of social interaction. The results

did not confirm the second hypothesis; that is, the levels of social interaction will vary with the children's reading ability. This lack of association tends to suggest that the process of understanding adults' directives in task definition involves higher mental functionings unrelated to reading ability. The implications suggest that the children with above average as well as low average reading abilities can be provided with enough strategic assistance to understand the task situation and share in the responsibility with solving the problem. In this study, these children were either aware of the logical inconsistencies in the implicit essays or given enough strategic information to share in the responsibility of being aware of these inconsistencies.

Educational Implications

One of the major benefits of this new developmental model theory of cognitive performance as opposed to cognitive competence is its direct relevance to education. Markman's studies have indiscriminatively assumed a level of competence in these children, and then, attempted to explain why these children are incapable of carrying out those processes. By adopting this theoretical assumption, instructors in the classroom have no "practical" basis from which to teach when dealing with the ability to detect logical inconsistencies implicitly stated in essays. It is already assumed that the child, cognitively, either has or doesn't have this ability. Whereas, this alternative to typical performance models, in contrast,

specify the actual psychological processes involved in a cognitive activity. From this theoretical perspective, instructors can identify the specific cognitive processes and, therefore, teach these strategies.

With respect to Vygotsky's "zone of proximal development" and to Wertsch's (1979) levels of interaction in transition from other-regulation to self-regulation, specific questioning strategies can be adopted in the classroom to lead children in the understanding of difficult implicit reading material. This recent line of research in reading has indicated that "students' interactions with questions have a direct impact on their learning" (Wixson, 1983, p. 291) and on their subsequent understanding of the reading material.

This study suggests that teachers should develop questioning strategies that direct the students from less specific inferences to the more specific questions and commands. Sequencing questions in that direction allows the students to problem solve at the self-regulation level before the need to use strategic assistance from an adult at the other-regulation level. Such a practice could allow the student to acquire at the intra-psychological level activities encountered at the inter-psychological level. Therefore, increasingly less directive means of transferring control should prove effective. Future research could explore the effects of adopting these questioning strategies over the exclusive use of specific questions and answers.

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Table 1

Levels of Interaction in Transition from

Other-Regulation to Self-Regulation

	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
Task Situation	Child's understanding very limited - initial development of task situation definition.	Child's understanding still far from complete agreement with adult.	Child's understanding definition coincides with adult.	
Social Context	Other-Regulation - questionable - adult provides strategic assistance but child unable to interpret.	Other-Regulation - limited - since child doesn't understand full implications of adult utterances in light of task demands.	Other-Regulation - but child has taken on significant share of share of strategic responsibility for the task.	Self-Regulation
Language Games	Mismatch of definition of task situation so great, that each has different language game-unable to perform task as adult perceives it.	Aware that adult utterances are concerned with task which allows child to make inferences necessary to participate fully.	Child can make all inferences necessary to interpret an adult directive.	
Communication Situation	Responds to deictics. (Non-verbal pointing)	Responds to specific questions & commands of adult in connection with task.	Responds to implicit directives - seems adult is just supplying reassurances that performance is correct.	Egocentric speech appears.
Psychological Planes	Interpsychological	Interpsychological	Interpsychological	Intrapsychological

|----------ZONE OF PROXIMAL DEVELOPMENT----------|

Table 2

Number of Students at Level of Social Interaction According to Sex

Sex	n	Level of Social Interaction			
		I	II	III	IV
Presentation of First Essay					
Females	30	16	2	3	9
Males	30	13	5	2	10
Presentation of Second Essay					
Females	30	6	5	3	16
Males	30	9	2	0	19

Table 3

Number of Students at Level of Social Interaction

Essay Content

Essay Content	n[a]	Level of Social Interaction			
		I	II	III	IV
Presentation of First Essay					
Ants	22	11	3	0	8
Fish	24	13	3	3	5
Snakes	14	5	1	2	6
(TOTAL)	(60)	(29)	(7)	(5)	(19)
Presentation of Second Essay					
Ants	18	3	3	0	12
Fish	21	5	1	2	13
Snakes	21	7	3	1	10
(TOTAL)	(60)	(15)	(7)	(3)	(35)

[a] n = number of times essay was used for each presentation.

Table 4

Number of Students at Level of Social Interaction

First and Second Presentation of Essays

First Presentation	Second Presentation			
	I	II	III	IV
Third Grade Students				
Level I	12	5	2	3
Level II	-	0	0	5
Level III	-	-	0	0
Level IV	-	-	-	3
Sixth Grade Students				
Level I	3	2	0	2
Level II	-	0	0	2
Level III	-	-	1	4
Level IV	-	-	-	16

Table 5

Number of Students at Level of Social Interaction According to Grade Levels

Grade Levels[a]	Level of Social Interaction			
	I	II	III	IV
Presentation of First Essay				
Third Grade	22	5	0	3
Sixth Grade	7	2	5	16
Presentation of Second Essay				
Third Grade	12	5	2	11
Sixth Grade	3	2	1	24

[a] n = 30 for each grade level.

Table 6

Number of Students at Level of Social Interaction

According to Reading Achievement Levels

	Level of Social Interaction			
Reading Levels[a]	I	II	III	IV
Presentation of First Essay				
Above Average	7	3	2	8
Average	10	2	3	5
Below Average	12	2	0	6
Presentation of Second Essay				
Above Average	3	1	1	15
Average	6	3	1	10
Below Average	6	3	1	10

[a] n = 20 students for each reading level.